TECHNICAL MEMORANDUM

Preliminary Remediation Goal for PCBs in Utility Corridor Soil—Ten-Mile Drain Superfund Site, St. Clair Shores, Macomb County, Michigan

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DATE:	July 11, 2017
PROJECT NUMBER:	679669.FS.01

Identification of Soil Preliminary Remediation Goal for Utility Worker

In support of the Feasibility Study, site-specific soil preliminary remediation goals (PRGs) for utility workers in utility corridors were calculated for polychlorinated biphenyl (PCB) exposure through the soil direct contact pathway in utility corridors along Bon Brae Street, Lakeland Street, and Ten-Mile Drain. The PRGs were identified for utility corridor soil using a 2-step process:

- Step 1 – calculation of risk and hazard estimates for a reasonably foreseeable future utility worker exposure scenario.
- Step 2 – calculation of risk-based PRGs for soil using the risk estimates obtained in Step 1.

Step 1 – Calculation of Risk and Hazard Estimates.

Risk and hazard estimates were calculated as described in the human health risk assessment (HHRA) (CH2M, 2016), although two exposure parameters were revised as requested by the U.S. Environmental Protection Agency (USEPA) – an exposure frequency of 20 days/year and an exposure duration of 5 years were used in the risk and hazard estimates based on a more site-specific reasonably foreseeable future utility worker scenario. Risks were calculated for potential utility worker exposures at three utility corridor locations:

- along Bon Brae Street
- along Lakeland Street
- along Ten-Mile Drain

The risk and hazard estimates for soil exposures by utility workers were calculated based on the exposure assumptions presented in Table 1 and the exposure point concentrations (EPCs) and toxicity values used in the HHRA. The EPCs and risk estimates are provided in Table 2.

Step 2 – Calculation of Risk-based PRGs

The PRGs were calculated using the EPCs from the HHRA (CH2M, 2016) and risks estimates in Table 2. The ratio between the target risk (or non-cancer hazard) and the calculated risk (or hazard) from PCBs in soil is used to calculate PRGs as follows:

PRG = (EPC x Target Risk) / Calculated Risk

PRG	=	preliminary remediation goal
EPC	=	exposure point concentration
Target Risk	=	variable for carcinogenic effects, and 1 for non-carcinogenic effects
Calculated Risk	=	cancer risk for carcinogenic effects, non-cancer hazard for non-carcinogenic effects

Note that both carcinogenic and non-carcinogenic effects must be taken into account when selecting PRGs. That is, the lower of the cancer-based and non-cancer-based PRG must be used when a specific target cancer risk level is selected. The soil PRGs (based on various target ELCR levels and HQ of 1) for the utility worker scenario are presented in Table 2.

References.

CH2M, 2016. Human Health Risk Assessment, Ten-Mile Drain Superfund Site. February.

Table 1. Exposure Parameters for Soil - Utility Worker

Ten-Mile Drain Superfund Site

St. Clair Shores, Macomb County, Michigan

				Exposure Factor Values Used in the 2016 Human Health Risk Assessment (CH2M, 2016)	
Ingestion	IR-S	Ingestion Rate of Soil	mg/day	330	USEPA, 2014
	EF	***Exposure Frequency***	days/year	***20***	***(1)***
	ED	***Exposure Duration***	years	***5***	***(1)***
	BW	Body Weight	kg	80	USEPA, 2014
	AT-N	Averaging Time (Non-Cancer)	days	7,300	(2)
	AT-C	Averaging Time (Cancer)	days	25,550	(3)
Dermal	SA	Skin Surface Area Available for Contact	cm^2	3,470	USEPA, 2014 (4)
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.3	USEPA, 2004
	DABS	Dermal Absorption Factor Solids	--	0.14	USEPA, 2004 (5)
	EF	***Exposure Frequency***	days/year	***20***	***(1)***
	ED	***Exposure Duration***	years	***5***	***(1)***
	BW	Body Weight	kg	80	USEPA, 2014
	AT-N	Averaging Time (Non-Cancer)	days	7,300	(2)
	AT-C	Averaging Time (Cancer)	days	25,550	(3)

Notes:

(1) Based on professional judgement.

(2) Calculated as the product of ED (years) x 365 days/year.

(3) Calculated as the product of 70 years assumed human lifetime (USEPA, 2014) x 365 days/year.

(4) SA includes head, hands, and forearms.

(5) Chemical-specific value for PCB.

USEPA, 2004: Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment).
USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.
CH2M, 2016: Human Health Risk Assessment, Ten-Mile Drain Superfund Site. February.

Table 2. Utility Worker Soil PRGs

Ten-Mile Drain Superfund Site

St. Clair Shores, Macomb County, Michigan

Utility Corridor Location	EPC (mg/kg)	Excess Lifetime Cancer Risks				Non-Cancer Hazards				Preliminary Remedial Goals (mg/kg) Based on Target Risk Levels:			Based on Hazard Quotient:
		Ingestion	Dermal	Inhalation	**Total**	Ingestion	Dermal	Inhalation	**Total**	$1x10^{-6}$	$1x10^{-5}$	$1x10^{-4}$	1
Bon Brae Street	71.29	2.3E-06	1.0E-06	3.9E-11	3.3E-06	0.8	0.4	NA	1.2	21	215	2148	61
Lakeland Street	17.75	5.7E-07	2.5E-07	9.8E-12	8.3E-07	0.2	0.09	NA	0.3	21	215	2148	61
Ten-Mile Drain	18.19	5.9E-07	2.6E-07	1.0E-11	8.5E-07	0.2	0.09	NA	0.3	21	215	2148	61

Notes:

Based on EF of 20 days/year and ED of 5 years

EPC = exposure point concentration

HHRA = Human Health Risk Assessment (CH2M, 2016)

CH2M, 2016: Human Health Risk Assessment, Ten-Mile Drain Superfund Site. February.